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EXAMINER	
BRINEY III, WALTER F	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/588,064	Applicant(s) YEAP ET AL.	
	Examiner Walter F Briney III	Art Unit 2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 8-12* is/are rejected.

7)☒ Claim(s) *6,7,13 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 June 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

The drawings are objected to because figure 3 does not label 14p and 14s even though they are referred to within context to figure 3 in the disclosure. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Overbury (US Patent 5,832,032).

Claim 1 is limited to **a noise cancellation circuit for a communications channel comprising a differential signal path and a common mode signal path connected to respective inputs of a summing device, the differential signal path comprising input means connected to the channel for receiving a differential signal therefrom and supplying the differential signal to a first of the inputs of the**

summing device; Overbury discloses a differential signal derived from a subscriber loop through a transformer that is combined with the common mode signal with an adder (figure 10, element diff(t), 102 and column 6, lines 17-26). **The common mode signal path comprising extraction means coupled to the channel for extracting therefrom a common mode signal, and coupling means for coupling at least part of the extracted common mode signal to the second of the inputs of the summing device as a common mode noise estimate signal**; Overbury discloses a common mode signal that is derived from the subscriber loop through resistors (i.e. extraction means) connected to the subscriber loop and is coupled to the summer after being weighted (i.e. common mode noise estimate signal) (figure 10, element cm(t), 111, 102 and column 6, lines 17-26). **The coupling means having a capacitive component equivalent to stray capacitance coupling between an input and an output, respectively, of the input means**; Overbury discloses a weighted function that is made of complex components (i.e. capacitive) that adjust the phase and amplitude (i.e. effects of capacitive coupling) to match the differential signal component (figure 10, element 111 and column 5, line 55 through column 6, line 4). **The circuit further comprising means for compensating for phase differences between the differential signal and common mode noise estimate signal before their application to the summing device**; Overbury discloses a weight that adjusts to minimize interference between the differential and common mode signal, and incorporates phase shifting to do that (column 5, line 55 through column 6, line 4). **The summing device providing as an output signal of the noise cancellation circuit the difference between the**

differential signal and the common mode noise estimate signal; Overbury discloses a summer that combines a differential signal with a weighted common mode signal that is phased to produce a differential signal that has minimized interference (column 5, line 19 through column 6 line 4). Therefore, Overbury anticipates all limitations of the claim.

Claim 8 is limited to **a method of canceling common mode noise in signals received from a communications channel using a noise cancellation circuit having input means connected to the channel, comprising the steps of: extracting via the input means from the channel a differential signal; extracting from the channel a common mode signal**; Overbury discloses a differential signal derived from a subscriber loop through a transformer (figure 10, element diff(t), 102 and column 6, lines 17-26) and a common mode signal that is derived from the subscriber loop through resistors (i.e. extraction means). **Passing at least part of the extracted common mode signal through a coupling device having a capacitive component equivalent to stray capacitance coupling between an input and an output, respectively, of the input means**; Overbury discloses a weighted function that is made of complex components (i.e. capacitive) that adjust the phase and amplitude (i.e. effects of capacitive coupling) to match the differential signal component (figure 10, element 111 and column 5, line 55 through column 6, line 4). **Compensating for phase differences between the differential signal and common mode noise estimate signal and obtaining the difference between the differential signal and the common mode noise estimate signal**; Overbury discloses a weight that adjusts to minimize interference between the differential and common mode signal, and incorporates phase

shifting to do that (column 5, line 55 through column 6, line 4). Therefore, Overbury anticipates all limitations of the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-3 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bingel et al. (US Patent 6,173,021) in view of Overbury.

Claim 2 is limited in part to **a noise cancellation circuit for a communications channel comprising a differential signal path**; Bingel discloses a differential receiver (figure 2, element 15 and column 3, lines 2-5). **A common mode signal path**; Bingel discloses a detector for receiving electromagnetic interference (i.e. common mode). **Connected to respective inputs of a digital adder**; Bingel discloses an adder (figure 2, element 12). **The differential signal path comprising input means connected to the channel for receiving a differential signal**; Bingel discloses a differential receiver (figure 2, element 15 and column 3, lines 2-5). **Therefrom and analog-to-digital converter means coupled to the input means for digitizing the received differential signal and applying the digitized differential signal to a first of the inputs of the digital adder**; Bingel discloses an ADC (figure 2, element 21) and an input to an adder (figure 2, element 12). **The common mode signal path comprising**

extraction means coupled to the channel for extracting therefrom a common mode signal; Bingel discloses a detector for receiving electromagnetic interference (i.e. common mode). **A second analog-to-digital converter means coupled to the extraction means for digitizing the extracted common mode signal**; Bingel discloses a second ADC (figure 2, element 16). **Adaptive filter filtering the digitized common mode signal to produce a digital common mode noise estimate signal and applying the digital estimate signal to the second input of the digital adder**; Bingel discloses a DSP that is adaptive (column 4, lines 7-13) that produces an interference cancellation signal (i.e. digital common mode noise estimate signal) (column 4, lines 13-16) and applies it to an adder (figure 2, element 12). **The adder providing as an output signal of the noise cancellation circuit the difference between the differential signal and the digital common mode noise estimate signal**; Bingel discloses an adder that eliminates interference thus producing an output signal by summing a wanted signal with noise to an estimated interference signal (figure 2, elements 12-13 and column 3, lines 24-27). Therefore, Bingel discloses all limitations of the claim with the exception of **applying the digitized extracted common mode signal to a noise detector for detecting one or more noisy frequency bands of the common mode signal and passing the digitized common mode signal in those detected frequency bands to an adaptive filter**; Overbury teaches to use a FFT and control means to compare common mode noise to a wanted signal in demodulated frequency bands (i.e. noise detector) (column 6, lines 26-48) and then passes those bands to the control means of the adaptive filter (figure 10, element 109, 105, 108) for

the purpose of adjusting a weight to remove interference on a differential signal in a narrow bandwidth so the noise is seen clearly above any other signal and eliminated without altering the wanted signal (column 6, lines 65-67). **Control means having inputs connected to the differential signal path and the common mode signal path**; Overbury teaches to use a control means connected to both the differential and common mode noise path (figure 10, element 109, 105, 108). **Determining correlation between signals in the differential signal path and common mode signal path and adjusting coefficients of the adaptive filter in dependence thereupon so as to reduce correlation between the differential and common mode signals**; Overbury teaches that a correlation process should be used with reference to the signal paths (figure 10, elements 105, 108, 109) to determine the weight function (i.e. adaptive filter), and a weight update signal will be sent to the weight function to adjust its values (i.e. adjust coefficients) for the purpose of canceling interference below the level of the wanted signal (column 6, lines 44-48). **The circuit further comprising means for compensating for phase differences between the differential signal and the common mode signal before their application to the digital adder**; Overbury teaches that the weight function adjusts for phase differences between the two signals (i.e. differential signal and the common mode signal) before adding them together (column 6, lines 1-4). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the digital signal processor configuration with a narrow band demodulator, control means, and adjustable weight for the purpose of adjusting a

weight to remove interference on a differential signal in a narrow bandwidth so the noise is seen clearly above any other signal without altering the original signal.

Claim 9 is limited in part to **a method of canceling common mode noise in signals received from a communications channel using a noise cancellation circuit having input means connected to the channel, the method comprising the steps of: extracting from the channel via the input means a differential signal and a common mode signal**; Bingel discloses a differential receiver and a detector for receiving electromagnetic interference (figure 2, element 15 and column 3, lines 2-5). **Digitizing same**; Bingel discloses two ADC (figure 2, element 21, 16). **Adaptive filter to produce a digital common mode noise estimate signal**; Bingel discloses a DSP that is adaptive (column 4, lines 7-13) that produces an interference cancellation signal (i.e. digital common mode noise estimate signal) (column 4, lines 13-16). **Before combining the digitized differential signal and the digital noise estimate signal subtractively to provide an output signal**; Bingel discloses an adder that eliminates interference thus producing an output signal by summing (i.e. combining subtractively) a wanted signal with noise to an estimated interference signal (figure 2, elements 12-13 and column 3, lines 24-27). Therefore, Bingel discloses all limitations of the claim with the exception of **using a digital noise detector, detecting in the digitized extracted common mode signal one or more noisy frequency bands of the common mode signal; passing the digitized common mode signal in those detected frequency bands through an adaptive filter**; Overbury teaches to use a FFT and control means or a narrow bandwidth demodulator (i.e. digital noise detector) to compare common

mode noise to a wanted signal in demodulated frequency bands (column 6, lines 26-48) and then passes those bands to the control means of the adaptive filter (figure 10, element 109, 105, 108) for the purpose of adjusting a weight to remove interference on a differential signal in a narrow bandwidth so the noise is seen clearly above any other signal and eliminated without altering the wanted signal (column 6, lines 65-67) the output of the noise detection is sent to an adaptive filter control (figure 10, element 109). **Determining correlation between the differential signal and common mode signal and adjusting coefficients of the adaptive filter in dependence thereupon so as to reduce correlation between the differential and common mode signals**; Overbury teaches that a correlation process should be used with reference to the signal paths (figure 10, elements 105, 108, 109) to determine the weight function (i.e. adaptive filter), and a weight update signal will be sent to the weight function to adjust its values (i.e. adjust coefficients) for the purpose of canceling interference below the level of the wanted signal (column 6, lines 44-48). **Compensating for phase differences between the differential signal and the digital common mode noise estimate signal**; Overbury teaches that the weight function adjusts for phase differences between the two signals (i.e. differential signal and the common mode signal) before adding them together (column 6, lines 1-4). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the digital signal processor configuration with a narrow band demodulator, control means, and adjustable weight for the purpose of adjusting a weight to remove interference on a differential signal in a

narrow bandwidth so the noise is seen clearly above any other signal without altering the original signal.

Claim 3 is limited in part to **the circuit further comprising a second common mode signal path connected between the common mode signal extraction means and a second input of the digital adder**; Bingel discloses an interference signal path (i.e. common mode) comprised of a detector and sampling/scaling device that is hooked into an adder means (figure 2, elements 9, 10, 12). **The output of the adaptive filter comprising a digital common mode noise estimate signal and being applied to a second input of the digital adder means**; Bingel discloses an adaptive filter whose output is an interference cancellation signal that is applied to the adder (figure 2, element 12 and column 4, lines 7-16). **The digital adder means providing as an output signal of the noise cancellation circuit the difference between the differential signal and the two common mode noise estimate signals**; Bingel discloses an adder that eliminates interference thus producing an output signal by summing a wanted signal with noise to an estimated interference signal (figure 2, elements 12-13 and column 3, lines 24-27). Therefore, it can be seen that Bingel discloses all limitations of the claim with the exception of **a noise cancellation circuit for a communications channel comprising a differential signal path and a first common mode signal path connected to respective inputs of a summing device**; Overbury teaches to connect a differential signal path to a common mode path to a summing device (figure 10, elements, diff(t), cm(t), 102) for the purpose of reducing the amount of power entering the demodulation apparatus by analogue cancellation prior to

processing in an ADC (column 6, lines 49-64). **The differential signal path comprising input means connected to the channel for receiving a differential signal therefrom and supplying same to a first of the inputs of the summing device**; Overbury teaches to couple a differential signal with a transformer and apply that signal to a summer (figure 10, element 102 and diff(t)). **The first common mode signal path comprising extraction means coupled to the channel for extracting therefrom a common mode signal and coupling means connected between the common mode extraction means and a second input of the summing means for coupling an analog common mode noise estimate signal to the summing means**; Overbury teaches to derive a common mode signal through resistors coupled to a receiving line and then hooking that common mode signal to a summer (figure 10, elements 100, 101, 102, cm(t)). **The coupling means having a capacitive component equivalent to stray capacitance coupling between the input and the output, respectively, of the input means**; Overbury teaches to couple cm(t) through a complex (i.e. capacitive) weight that adjusts for phase and magnitude differences between diff(t) and cm(t) (i.e. equivalent to stray capacitance coupling) (figure 10, element 111 and column 6, lines 1-4) **and first compensating means for compensating for phase differences between the differential signal and analog common mode noise estimate signal before their application to the summing device**; Overbury teaches that the weight function (figure 10, element 111) adjusts for the phase differences between the differential signal and the common mode signal. **The output of the summing device being connected by way of an analog-to-digital**

converter to a first input of a digital adder means; Overbuy teaches to take the difference between the differential signal and the common mode signal and run them through an ADC (figure 10, elements 102-103) the analog processing was to prevent overloading on the ADC, so now processing as disclosed by Bingel can occur without added distortion. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the analog cancellation system as taught by Overbury for the purpose of reducing the amount of power entering the demodulation apparatus by analogue cancellation prior to processing in an ADC. **The second common mode signal path comprising a noise detector connected by way of an analog-to-digital converter to the output of the common mode extraction means**; Overbury discloses using a demodulator noise detector that is connected to the common mode signal through an ADC (figure 10, elements cm(t), 106, 107) for the purpose of adjusting a weight to remove interference of a differential signal in a narrow bandwidth so the noise is seen clearly above any other signal and eliminated without altering the wanted signal (column 6, lines 44-48 and 65-67). **The noise detector being operable to detect one or more noisy frequency bands of a digitized common mode signal from the analog-to-digital converter means and pass the digitized common mode signal in those detected frequency bands to an adaptive filter**; Overbury teaches to use a FFT and control means to compare common mode noise to a wanted signal in demodulated frequency bands (column 6, lines 26-48) and then passes those bands to the digital control means of the adaptive filter (figure 10, element 109, 105, 108). **Control means having inputs connected to the differential signal path and the**

common mode signal path; Overbury teaches to use a control means connected to both the differential and common mode noise path (figure 10, element 109, 105, 108). **Determining correlation between signals in the differential signal path and common mode signal path and adjusting coefficients of the adaptive filter in dependence thereupon so as to reduce correlation between the differential and common mode signals**; Overbury teaches that a correlation process should be used with reference to the signal paths (figure 10, elements 105, 108, 109) to determine the weight function (i.e. adaptive filter), and a weight update signal will be sent to the weight function to adjust its values (i.e. adjust coefficients) canceling interference below the level of the wanted signal (i.e. reduce correlation) (column 6, lines 44-48). **The circuit further comprising second compensating means for compensating for phase differences between the signal output from the first summing means and the digital common mode noise estimate signal before their application to the respective inputs of the digital adder means**; Overbury teaches that the weight function (figure 10, element 111) adjusts for the phase differences between the differential signal and the common mode signal (column 6, lines 1-4) before being applied to the adder of Bingel (figure 2, element 12). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the adaptive filter coupled with the narrow bandwidth noise detection system as taught by Overbury for the purpose of adjusting a weight to remove interference on a differential signal in a narrow bandwidth so the noise is seen clearly above any other signal and eliminated without altering the wanted signal.

Claim 10 is limited in part to **a method of canceling noise in signals received from a communications channel using a noise cancellation circuit having input means connected to the channel, the method comprising the steps of; extracting via the input means from the channel a differential signal; extracting from the channel a common mode signal**; Bingel discloses an interference signal path (i.e. common mode) comprised of a detector and sampling/scaling device that is derived from a differential receiver path and applied to an adder (figure 2, elements 9, 10, 12 and column 3, line 54 through column 4 line 4). **The output of the adaptive filter comprising a digital common mode noise estimate signal and being applied to a second input of the digital adder means**; Bingel discloses an adaptive filter whose output is an interference cancellation signal (figure 2, element 12 and column 4, lines 7-16). **The digital adder means providing as an output signal of the noise cancellation circuit the difference between the differential signal and the two common mode noise estimate signals**; Bingel discloses an adder that eliminates interference thus producing an output signal by summing a wanted signal with noise to an estimated interference signal (figure 2, elements 12-13 and column 3, lines 24-27). Therefore, it can be seen that Bingel discloses all limitations of the claim with the exception of **passing at least part of the extracted common mode signal through a coupling device having a capacitive component equivalent to stray capacitance coupling between an input and an output, respectively, of the input means**; Overbury teaches to couple cm(t) through a complex (i.e. capacitive) weight that adjusts for phase and magnitude differences between diff(t) and cm(t) (i.e. so equivalence to

stray capacitance coupling is met) (figure 10, element 111 and column 6, lines 1-4). **Compensating for phase differences between the differential signal and common mode noise estimate signal**; Overbury teaches that the weight function (figure 10, element 111) adjusts for the phase differences between the differential signal and the common mode signal (column 6, lines 1-4). **Obtaining the difference between the differential signal and the common mode noise estimate signal**; Overbury teaches to subtract the differential signal and the weighted common mode signal (column 6, lines 24-26). **Extracting from the channel via the input means a differential signal and a common mode signal and digitizing same**; Overbury teaches to take the difference between the differential signal and the common mode signal and run it through an ADC (figure 10, elements 102-103), the common mode signal is digitized with an ADC as well (figure 10, element 106). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the analog cancellation system as taught by Overbury for the purpose of reducing the amount of power entering the demodulation apparatus by analogue cancellation prior to processing in an ADC. **Using a digital noise detector, detecting in the digitized extracted common mode signal one or more noisy frequency bands of the common mode signal**; Overbury discloses using a demodulator noise detector that is connected to the common mode signal through an ADC (figure 10, elements cm(t), 106, 107) for the purpose of analyzing the common mode signal in narrow bandwidth to effectively cancel interference for the purpose of adjusting a weight to remove interference on a differential signal in a narrow bandwidth so the noise is seen clearly above any other

signal and eliminated without altering the wanted signal (column 6, lines 44-48 and 65-67). **Passing the digitized common mode signal in those detected frequency bands to an adaptive filter to produce a digital common mode noise estimate signal**; Overbury teaches to use a FFT and control means to compare common mode noise to a wanted signal in demodulated frequency bands (column 6, lines 26-48) and then passes those bands to the digital control means of the adaptive filter (figure 10, element 109, 105, 108), the filter then updates a complex weight thus producing a cancellation signal (i.e. digital common mode noise estimate signal) which is seen in Bingel (figure 2, element 11). **Determining correlation between the differential signal and common mode signal and adjusting coefficients of the adaptive filter in dependence thereupon so as to reduce correlation between the differential and common mode signals**; Overbury teaches that a correlation process should be used with reference to the signal paths (figure 10, elements 105, 108, 109) to determine the weight function (i.e. adaptive filter), and a weight update signal will be sent to the weight function to adjust its values (i.e. adjust coefficients) canceling interference below the level of the wanted signal (column 6, lines 44-48). **Compensating for phase differences between the differential signal and the digital common mode noise estimate signal before combining the digitized differential signal and the digital noise estimate signal subtractively to provide an output signal**; Overbury teaches that the weight function (figure 10, element 111) adjusts for the phase differences between the differential signal and the common mode signal (column 6, lines 1-4) before applying the output to the digital adder of Bingel (figure 2, element 12). It would

have been obvious to one of ordinary skill in the art at the time of the invention to use the digital adaptive filter coupled with the narrow bandwidth noise detection system as taught by Overbury for the purpose of adjusting a weight to remove interference on a differential signal in a narrow bandwidth so the noise is seen clearly above any other signal and eliminated without altering the wanted signal.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Overbury in view of Felsberg (US Patent 3,825,843).

Claim 4 is limited in part to the noise cancellation circuit according to claim 1, as covered by Overbury. Therefore, Overbury discloses all limitations of the claim except **wherein the first compensating means comprises an analog delay unit interposed between the input means and the summing device and having a delay period substantially equal to delay introduced in the analog common mode signal path**. Felsberg teaches to add a delay line made of coaxial cable (i.e. analog delay unit) to distortion cancellation circuits for the purpose of equalizing the delay between the input signal path (i.e. input means) and the derived compensation signal (i.e. analog common mode signal path) so their initial phase relationship is maintained at the output (i.e. summing device) (figure 2, element 13 and column 4, lines 27-51). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a delay line for the purpose of equalizing the delay between the input signal path and the derived compensation signal so their initial phase relationship is maintained at the output.

Claim 5, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bingel in view of Overbury as applied to claims 3, 8, and 10 above, and further in view of Felsberg.

Claim 5 is limited in part to the noise cancellation circuit according to claim 3, as covered by Overbury. Therefore, Overbury discloses all limitations of the claim except **wherein the first compensating means comprises an analog delay unit interposed between the input means and the summing device and having a delay period substantially equal to delay introduced in the analog common mode signal path.** Felsberg teaches to add a delay line made of coaxial cable (i.e. analog delay unit) to distortion cancellation circuits for the purpose of equalizing the delay between the input signal path (i.e. input means) and the derived compensation signal (i.e. analog common mode signal path) so their initial phase relationship is maintained at the output (i.e. summing device) (figure 2, element 13 and column 4, lines 27-51). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a delay line for the purpose of equalizing the delay between the input signal path and the derived compensation signal so their initial phase relationship is maintained at the output.

Claims 11 and 12 are limited in part to the noise cancellation circuit according to claims 8 and 10, respectively, as covered by Overbury. Therefore, Overbury discloses all limitations of the claim except **wherein the compensation is provided by delaying the differential signal by a delay period substantially equal to delay incurred by the analog common mode signal during extraction and noise detection**. Felsberg teaches to add a delay line made of coaxial cable (i.e. analog delay unit) to distortion

cancellation circuits for the purpose of equalizing the delay between the input signal path (i.e. input means) and the derived compensation signal (i.e. analog common mode signal path) so their initial phase relationship is maintained at the output (i.e. summing device) (figure 2, element 13 and column 4, lines 27-51). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a delay line for the purpose of equalizing the delay between the input signal path and the derived compensation signal so their initial phase relationship is maintained at the output.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter:

Claims 6, 7, 13, and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 6 and 7 are limited in part to the noise cancellation circuit according to claims 1 and 3, respectively, as covered by Overbury. In addition, **wherein the input means comprises a hybrid transformer**; Overbury discloses an input means comprising a transformer (i.e. hybrid transformer) (figure 10). **The coupling means comprises a second hybrid transformer similar to the first hybrid transformer, the primary winding of the second hybrid transformer being short-circuited and connected to the output of the common mode signal extraction means for reception of the common mode signal and the secondary winding of the second transformer being connected to said second input of the summing device.** As

such, the prior art neither anticipates nor makes obvious the circuit configuration claimed; therefore, claims 6 and 7 are allowable matter.

Claims 13 and 14 are limited in part to the noise cancellation circuit according to claims 8 and 10, respectively, as covered by Overbury. In addition, **wherein the input means comprises a hybrid transformer**; Overbury discloses an input means comprising a transformer (i.e. hybrid transformer) (figure 10). **The coupling is achieved using a second hybrid transformer similar to the first hybrid transformer, the primary winding of the second hybrid transformer being short-circuited and connected for reception of the common mode signal and the secondary winding of the second transformer providing the common mode signal**. As such, the prior art neither anticipates nor makes obvious the circuit configuration claimed; therefore, claims 13 and 14 are allowable matter.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter F Briney III whose telephone number is 703-305-0347. The examiner can normally be reached on M-F 8am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W Isen can be reached on 703-305-4386. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

WFB
August 18, 2003

MINSUN OH HARVEY
PRIMARY EXAMINER